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## Original Research Article

# Morphological evaluation of obstetric hysterectomy specimen in females with postpartum hemorrhage

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## ABSTRACT

**Background:** Obstetric hysterectomy (OH) is the removal of the uterus at the time of caesarean section, following vaginal delivery or within the puerperium period. Despite developments in the conservative medical & surgical management of OH, it remains a lifesaving technique for the management of persistent hemorrhage refractory to conservative control. Histopathological examination of the specimen is necessary as it determines the cause of OH and confirms the clinical and radiological indications.

**Methods:** This was cross-sectional observational study conducted from January 2017 to December 2022. It was conducted on 62 obstetric hysterectomy specimens.

**Results:** The proportion of OH was 6.05% out of a total 1024 hysterectomies. The age range of the study population was 20-45 years with a mean of  $30.35 \pm 5.25$  years. The trend towards OH increased with an increase in LSCS and it has been considered as an underlying high-risk factor for OH. The chief morphological abnormalities found were placenta accreta, placenta previa, placenta increta, placenta percreta, and retained placenta, followed by subinvolution. The radiological and morphological findings in 21 cases showed a statistically significant association.

**Conclusions:** Abnormal placentation is the predominant cause of obstetric hysterectomy. The association between the rising CS rate and incidence of obstetric hysterectomy with a history of CS is attributable mostly to the occurrence of morbidly adherent placenta/placenta increta. These abnormalities are amenable to early diagnosis by imaging methods.

**Keywords:** Histopathology, Obstetric hysterectomy

## INTRODUCTION

Obstetric hysterectomy (OH) is defined as removal of the uterus at the time of caesarean section or following vaginal delivery or within the puerperium period.<sup>1</sup> It is an indispensable and lifesaving procedure in a clinical scenario of obstetric hemorrhage unamenable to medical management and conservative surgical techniques.

Primary postpartum hemorrhage (PPH) is defined as a blood loss of more than 500 ml within the first twenty-four hours after birth, any quantity sufficient to produce hemodynamic instability in the mother, or a blood loss of

more than 10% of the total blood volume. Hemorrhage, usually occurring in the post-partum period, is responsible for between one-quarter and one-third of obstetric deaths.<sup>2</sup>

Common causes of primary PPH are uterine atony, lacerations, retained placenta, abnormally adherent placenta, defects of coagulation, uterine inversion.<sup>3</sup>

Pukhrambam et al in their study in 2015 on histomorphological study of the uterus in 64 peripartum hysterectomy specimens inferred that histopathological diagnosis not only confirmed the clinico-radiological impression, but also highlighted the other co-morbid

associations that caused the intractable haemorrhage which warranted a peripartum hysterectomy.<sup>4</sup>

The incidence of OH due to uterine atony has been declining from 42% to 29 % whereas incidence of OH due to abnormal placentation is on rise from 25 % to 41% due to c-sections deliveries.<sup>5</sup>

This study was conducted for morphological evaluation of OH specimens to determine the causes, their trends and risk factors of PPH and know the demographic data of mothers.

## METHODS

### *Type of study and study period*

This was retrospective, cross-sectional observational study conducted from January 2017- June 2020 (three and half years) then prospective observational study from July 2020- December 2022 (two and half years) i.e., six years. Prior to commencement of this study, Thesis & Ethical Committee of Tertiary Care Centre and Medical College had approved the thesis protocol.

### *Sample size*

This study was conducted on 62 OH specimen received in department of pathology.

### *Study population*

OH done in pregnant females in our hospital. Out of the total 1024 hysterectomy cases in the duration of 6 years, all 62 patients with OH were included in the study.

### *Inclusion criteria*

All women who delivered in hospital between January 2017 to December 2022 and underwent hysterectomy for obstetric indications at the time of delivery or subsequently within 6 weeks of delivery. All women who delivered outside the hospital between January 2017 to December 2022 and were referred for obstetric complications requiring hysterectomy for obstetric causes within 6 weeks of delivery were included in the study

### *Exclusion criteria*

Women undergoing hysterectomy for non-obstetric indications, women undergoing hysterectomy after 6 weeks postpartum were excluded from this study.

The standard proforma was used to record the case records kept in hospital wards as well as the request form that was delivered with the samples to study the clinical history.

The proforma included all information like: 1) Age, 2) Clinical indication for OH, 3) Parity, 4) Uterus, cervix, placenta and adnexal structures-morphology and histology

studied, 5) Laboratory investigations, 6) Radiological investigation.

The macroscopic features of the hysterectomy and placenta specimens that were received from the Obstetrics and Gynaecology department were evaluated. After being washed to remove extra blood, the hysterectomy specimens were fixed in 10% buffered formalin. The length, lateral, and anterior-posterior dimensions of the uteri and ovaries were measured.

To document any irregularities in shape and gross discoveries on the cut surface, an external examination was conducted. The standard protocol of tissue processing was followed. Wherever it was deemed required, special stains were applied.

The senior pathologist who specializes in female genital tract pathology evaluated the relevant sections, and diagnoses were made in accordance with the standard textbooks.

Numbers, percentages and p values were calculated for the data compiled.

## RESULTS

### *Proportion of OH*

A total of 1024 hysterectomies were performed in the institute over a period of six years from 2017 to 2022. Among them, 62 were OH (6.05%). Total deliveries were 45,000 in this period so incidence of OH was 1.4/1000 deliveries.

### *Year-wise trend of OH*

The year-wise trend of OH in the institute was studied. The number of OH was found to increase consistently from 2017 to 2022, except for the year 2020, in which it faced a decline (Table 1).

**Table 1: Year-wise trend of obstetric hysterectomy.**

Year	Number of OH
2017	5
2018	11
2019	11
2020	3
2021	14
2022	18
Total (over six years)	62

### *Maternal mortality post OH*

Maternal mortality following OH was 2/62 i.e. 3.23% (3 per 100 deliveries undergoing OH). One of the patients who died was 45 years old with rupture of the uterus and

bladder tear. The other one was a 32-year-old patient with a sub involution and intractable PPH.

### Age

The age range of the study population was observed to be 20 to 45 years with a mean of  $30.35 \pm 5.25$  years. Also, a majority of the women belonged to the age group of 26 to 30 years ( $n=21$ , 33.87%) and 31 to 35 years ( $n=20$ , 32.26%). The age distribution of cases is as shown in Table 2.

**Table 2: Age distribution of obstetric hysterectomy.**

Age group in years	Number (n=62)	Percentage (%)
≤ 20	2	3.23
21-25	12	19.35
26-30	21	33.87
31-35	20	32.26
36-40	5	8.06
>40	2	3.23
<b>Total</b>	<b>62</b>	<b>100.00</b>

### Risk factors for OH

An attempt was made to identify the risk factors for OH in this study population.

### Parity

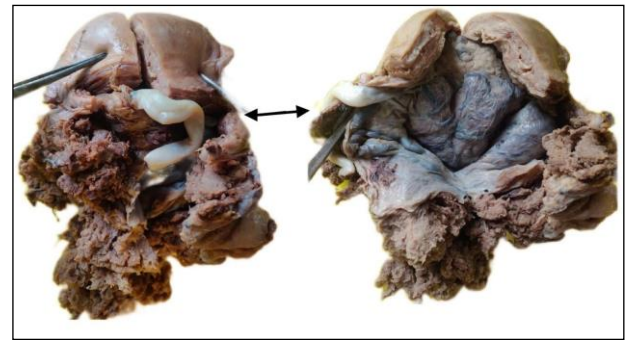
Most of the patients in this study were multiparous ( $n=57/62$ , 91.93%). Majority had parity three ( $n=27$ , 43.55%) followed by two ( $n=26$ , 41.94%) with p value 0.023. An increase in the OH among women with higher parity beyond three was not observed in this study.

### Past h/o LSCS

Out of 62 females fifty-six females (90.2%) gave history of past LSCS. Most had one LSCS ( $n=35$ , 56.45%). Eighteen females had two LSCS (29.03%) and 3 had past three LSCS (4.84%). Present delivery was normal vaginal delivery in 41/56 females (73.2%) with p value 0.122. Six of the women (9.68%) did not have any past history of LSCS and present delivery was also normal vaginal delivery.

### Past h/o LSCS v/s abnormal placentation

An association between abnormal placentation and past h/o LSCS was evaluated by the Chi square test. Thirty three of 56 females (59%) revealed abnormal placentation. It was statistically significant ( $p=0.009$ ). There were 5 placenta accreta (Figure 1), 5 placenta previa (Figure 2), 4 placenta increta (Figure 3), 2 placenta percreta (Figure 4 and 5), and 17 females had combination of abnormal placentation.



**Figure 1: Obstetric hysterectomy due to placenta previa with accreta - placenta along with umbilical cord protruding out of the lower uterine segment.**



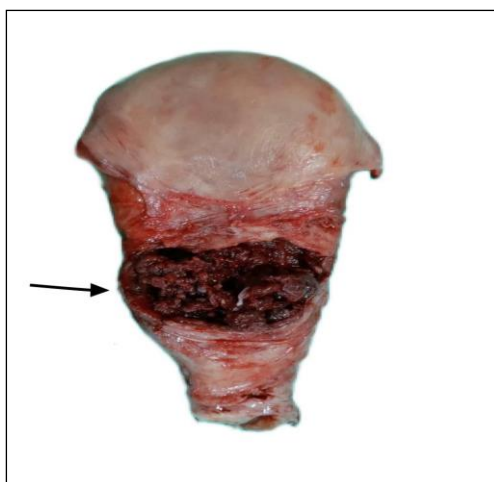
**Figure 2: Obstetric hysterectomy due to placenta previa-placenta along with umbilical cord protruding out of the lower uterine segment.**



**Figure 3: Obstetric hysterectomy due to placenta increta-cut surface shows placental tissue infiltrating the myometrium in the lesion corresponding to the iatrogenic defect. The thinning of the myometrium (arrow) noted in a case of placenta increta.**

### Associated significant history with OH

Five females had significant history associated with PPH of disseminated intravascular coagulation (1), intrauterine fetal death (IUFD) (1), history of postpartum haemorrhage in previous delivery (1), sepsis with acute kidney injury (1), and twins with IUFD and type two diabetes (1).

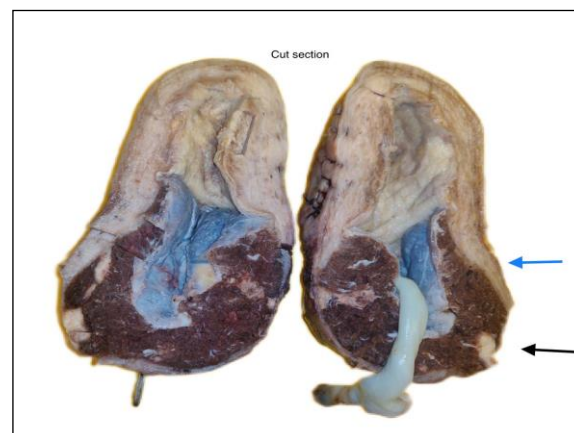


**Figure 4: Intraoperative finding of placenta percreta.**  
Note the placenta protruding out of the uterus.

### Morphological changes in OH

The morphological changes in the obtained specimens of OH were determined. It was observed that the most common morphological finding was abnormal placentation (n=34, 54.84%), followed by subinvolution

(n=12, 19.35%). Abnormal placentation included placenta accreta (n=5, 8.06%), placenta previa (n=5, 8.06%), placenta increta (n=4, 6.45%), placenta percreta (n=2, 3.23%) and the remaining 18 were a combination of these (Table 3). The observations and results of present study were compared with similar studies (Table 3).



**Figure 5: Obstetric hysterectomy due to Placenta percreta. Placenta increta (blue arrow) and percreta (black arrow) in the same case.**

**Table 3: Morphological change seen in the obstetric hysterectomy specimens.**

Morphological change	Number	Percentage
Abnormal placentation	34	54.84
Sub involution	12	19.35
Rupture uterus	8	12.90
Retained placenta	4	6.45
Others	4	6.45
Atonic postpartum haemorrhage	3	4.83
Endocervicitis+ endocervical polyp	1	1.61
Total	62	100

## DISCUSSION

### Incidence

In the present study incidence of OH was 1.4/1000 deliveries. Variable rates of OH have been reported worldwide. The incidence reported in this study is comparable to incidence of 1.39/1000 deliveries reported by Daskalis et al from Athens, Greece.<sup>6</sup> Another study from India by Chawla et al and from China by Zhang et al reported much less incidence of 0.83/1000 deliveries and 0.63/1000 respectively.<sup>7,8</sup> Incidence reported from Pakistan was 5.8/1000 deliveries by Shahid et al. Disparity in the rates of OH between the countries highlights the differences in the quality of obstetric care.

### Age

The age range of the study population was observed to be 20 to 45 years with a mean age of approximately 30 years.

An almost similar age distribution of the population was reported by Shahid et al in their study in Karachi, Pakistan, with the mean age of their cases being 30.59 years and the age range being 20 to 45 years<sup>1</sup>; and also, by Pukhrabam et al in their study in Imphal, Manipur, India, with the mean age being 32.8 years and the age range being 21 to 45 years<sup>3</sup>. Similarly, in the study by Awale et al in Lucknow, Uttar Pradesh, India; the females ages ranged from 20 to 36 years, with a mean age of 28.6 years<sup>29</sup>. In the study by Chawla et al in New Delhi, India, Women in the 20-30-year-old age group constituted over 70% of cases<sup>49</sup>. There was no effect of race, religion, ethnicity and geography.

### Changing trends of OH, risk factors and morphological changes in OH

Eduardo Porro of Milan documented his first planned caesarean hysterectomy in 1876 and advocated hysterectomy during a caesarean section to control uterine



haemorrhage and prevent infection. This operation came to be known as Porro's Operation.<sup>10</sup>

After 1882, the classic caesarean operation without hysterectomy as popularised by Max Sanger began to replace the Porro operation as the surgical technique of choice because the rates of maternal morbidity and mortality were lower.<sup>11</sup>

The availability of powerful uterotonics and broad-spectrum antibiotics, as well as the development of embolisation techniques and new ways of vascular ligation, all significantly reduced the need for obstetric hysterectomy.

Over the last one-half century, a significant rise in CSs was observed.

Chestnut et al conducted a retrospective review of 117 women who underwent peripartum hysterectomy at Duke University Medical Center during the past 21 years. Seventy-three caesarean hysterectomies were performed electively; 44 caesarean or postpartum hysterectomies were performed as emergencies. Separate analysis of elective caesarean hysterectomy patients revealed statistically significant decreases in operative time, estimated blood loss, intra-operative and total blood replacement, and postoperative hospital stay.<sup>12</sup>

A systematic review was conducted using PubMed, EBSCO and Medscape databases to identify studies

published from 2000 to 2015. A total 22 articles were included from eighteen different countries. All of them showed an overwhelming prevalence of CS, compared with the stipulated by the WHO, with a mean of 45.2% of CS worldwide. The rate of caesarean delivery was higher at the private hospitals than in the public ones.<sup>13</sup>

The caesarean section (CS) rate continued to increase across high-income, middle-income and low-income countries. Latest available data (2010-2018) from 154 countries covering 94.5% of world live births showed that 21.1% of women gave birth by caesarean worldwide.<sup>14</sup>

This study also observed that the trend of obstetric hysterectomy increased consistently from 2017 to 2022.

This study found a statistically significant association between past h/o LSCS and abnormal placentation ( $p = 0.009$ ). This observation gets a support by a study conducted by Flood et al. Their large retrospective cohort study spread over two decades from 1966-1975 and 1996-2005 revealed that overall caesarean delivery rate increased from 6-19% during these 2 decades and the percentage of OH that occurs in the setting of a previous caesarean delivery has increased from 27-57% ( $p$  value 0.00001). Indications for OH changed significantly in this time period, with "uterine rupture" as the indication for OH decreasing from 40.5-9.3% ( $p$  value 0.0001) and placenta accreta as the indication increasing significantly from 5.4-46.5% ( $p$  value 0.00001).<sup>15</sup>

**Table 4: Comparison of current study with similar studies.**

Pat-hology years	Study	Incidence OH n/1000 deliveries	Uterus rupture	Abnormal placenta-tion	Subin-vo	Retained placenta	Atonic PPH	Others-endocervicitis, polyp, endomyometritis	Abrup-tion placenta	Past h/o lscs
2007	Daskalakis et al	45/32,338 1.39	0	35	0	0	8	0	2	27
2015	Chawla et al	56/67562 .83	10	17	0	0	14	6	5	11
2017	Zhang et al	96/152023 0.63	18	51	0	0	36	0	0	47
2019	Awale et al	12/915 hysterectomy* 13	3	5	4	0	2	0	0	5
2020	Shahid et al	96/16446 5.8	15	64	1	0	2	8	1	Not given
2023	Present study	62/45,000 1.4	8	34	12	4	3	1	0	56

Awale et al study had mentioned total number of hysterectomy in their study. Total number of delivery was not given

This study has few limitations. The study is conducted on a small study population group catered by single tertiary care hospital and for a limited duration of two years. Therefore, the observations cannot be generalized. Maternal and neonatal outcomes were not considered. Therefore, the clinical impact of the morphological changes observed in the study could not be deciphered.

## CONCLUSION

The study thus concludes that abnormal placenta-tion is the predominant cause of obstetric hysterectomy. The association between the rising CS rate and incidence of obstetric hysterectomy with a history of CS is attributable mostly to the occurrence of morbidly adherent placenta/placenta Increta. Therefore, a continuous

monitoring of the rates of LSCS, their significant morbidity potential and corresponding increase in rate of obstetric hysterectomy is recommended. The need for directed special training with respect to management of placental issues, appropriate antenatal counselling, and the implications for service planning are all factors to be considered strongly.

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*Conflict of interest: None declared*

*Ethical approval: The study was approved by the Institutional Ethics Committee*

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